STURGEON UPDATE 2001

LAKE WISCONSIN / WISCONSIN RIVER

SUMMARY

Monitoring of the Lake Wisconsin / Wisconsin River lake sturgeon fishery has been conducted over the past 22 years.

Reproduction
Reproduction was much higher around 1980 than the early – mid 1990s. Signs of increasing reproduction have re-appeared in the late 90s.

Harvest
Harvest has declined on Lake Wisconsin due primarily to 2/3 less angling pressure occurring, but has remained fairly steady below the Dells Dam. It has increased below the Sauk Dam, on a fishery which we have recently learned is migratory between the Sauk Dam and Pool 10 of the Mississippi River.

Signs of overharvest continue to be noted.

* A dramatic increase in the percent harvested within 5" of the size limit is occurring with the Lake Wisconsin/Dells fishery, though this could be skewed somewhat from 1995 on by the influx of the 1980 recruits which are now 50 – 55".
* The catch rate has yet to return to the .4/hr level of the early – mid 1980s on the lake. This means that after the decline (harvest) of the high year classes of 1980 era, the harvestable stock will be less until the increased reproduction now documented in the late 90s reaches 50" (ie. 2015).
* The Female : Male harvest ratio is alarming. It is declining. It should increase as fish grow older, as females outlive males. This indicates high harvest of the female population.

Regulations
Regulations have become more restrictive in response to increasing knowledge about the fishery. The increase from a 45" to 50" minimum size limit in 1991 saw a reduction in harvest for a few years below both dams, until the newly protected 45-49" fish grew to 50" (2-3 years). The, newly enacted, alternating 70"/50" minimum size limit initially appears to have dropped the average annual harvest by almost 30% below both dams, with a 38% decline in angling pressure below the Sauk Dam during the first 70" size limit season of 2000.

Re-stocking Original Home Range
Juveniles were transferred from L. Wisconsin during 1991-92 and both fry and fingerlings from eggs taken below the Dells Dam (1997-01) have been restocked, in an effort to re-establish the sturgeon fishery upstream to Steven Point. Survival of these fish has been noted.

Monitoring Trends

Recruitment

Natural reproduction is the building block of the fishery. It is indirectly monitored by catch rate (Table 1) and length composition of angler caught fish (Table 2).

Lake Wisconsin: On Lake Wisconsin, in the early-mid 1980s angler diaries reported catch rates of .4/hr, with 40-60% of the catch being fish less than 30" (5yr). Lots of small sturgeon were caught and anglers on the lake spent 13,000 hours fishing for them during the 1979 season. Through the 90s the catch rate dropped to <.1/hr and the catch of fish <30" varied from only 10-40%. Angling pressure dropped off 3 times to only 4,000 hours, measured by repeat creel census in 1995 and 1998. However in 1999 and 2000 angler diary catch rates increased slightly to .11-.15/hr with nearly 60% of the catch again being fish less than 30". This suggests better reproduction is finally occurring, but numbers are not as high as the early 1980s. Another quick peak at recruitment is the <45":>45" fish caught. With good reproduction in the early 80s this ratio was 20:1. Through the 90s it dropped to 2-3:1 but shows a rebound in 99-01 to 7-10:1.

Dams: Through the 90s, below both the Dells and Sauk dams, the catch rate on all sizes of sturgeon vary, but is slightly higher than on the lake, at about .2/hr. As on the lake, more small fish (<30") were present from 1997-2001 than earlier years, ie. about 40-60% at the Dells and 36-44% below the Sauk Dam in 97 and 00. The <45":>45" ratio at the Dells Dam stayed above 5:1, with 10:1 values in the early 90s. It dropped to 5:1 in the mid 90s and as on the lake has recently risen again to higher levels (9-27:1) This ratio below Sauk has stayed low through the 90s at 2:1 or less.

Harvest

In a balanced fishery, harvest must not exceed recruitment. In fact harvest needs to be less than recruitment to allow more large fish to accrue, thus allowing anglers quality size fish to catch and maintaining a brood stock of females. A female sturgeon does not spawn until 55", then is only mature once every four years. A recruitment rate of only 5% is a generally accepted principal with slow growing fish like sturgeon (ie. the number of 48-49" fish that grow to the 50" size limit equals 5% of the number of fish greater than 50")" Unfortunately, it is not possible to know the number of harvestable sturgeon in the population, which constantly varies because of variable reproduction.

Lake Wisconsin / Dells

Though there are 35 miles of river between L. Wisconsin and the Dells, the entire area is considered one sturgeon fishery as there are no barriers separating them and past tagging information documents movement between locations. Table 3 documents sturgeon harvest since the beginning of mandatory registration in 1983. The combined harvest from 1983-1990 (45" minimum size limit) averaged 68. A 1979-81 study determined a conservative estimate of 1000 legal fish. Thus, harvest was about 7%, which led to a change in the size limit to a 50" minimum in 1991. From 1991-95 annual harvest averaged 25 and from 1996-99 it declined to 20/year. This would equal 2-2.5%, which is acceptable, but concern was expressed about declining reproduction through the 90s. It was also documented that fishing pressure had dropped 3X on the lake. If pressure would increase again to the 1979 level, harvest would again be 60-75/yr which is too high.

Another factor, which has played into the need to restrict harvest, is the increasing composition of harvest within 5" of the size limit. A "rule of thumb" for sturgeon harvest is no more than 50% of harvest should

be within 5" of the size limit. Table 4 documents the length distribution of the harvest. On the Lake, from 1978-1990 (45" size limit) slightly more than the 50% level were from 45-49" and based on the composition of harvested fish greater than 50", from 1983-1990, only 42% were 50-54". Concern arises with an increasing level, which has now risen to 70%, since 1996 at both the Dells and on the Lake. This in part could be influenced by the high reproduction of the early 80s, which by the late 90s have grown into the 50-55" size range.

Since 1997, with the cooperation of anglers and the registration stations, we have been able to determine the sex of the harvest (Table 5). The Lake Wisconsin / Dells data shows fish from 50-54" are comprised of an equal portion of males and females. However because females tend to live longer, the 55-59" harvest group is skewed in favor of 7 females to 1 male. The real concern though is that of harvested fish over 60", it's back to an even ratio, indicating overharvest of females had occurred. The Sauk Dam data with a larger sample of fish, also shows a low 2:1 female:male ratio for 60"+ fish. In a less harvested fishery the F:M ratio should increase with older fish.

Another conservative step in management of this rare and unique fishery was taken in the year 2000. In 2000 and all succeeding even numbered years, the legal size limit was increased to 70". Odd numbered years beginning in 2001 will retain the 50" size limit. Harvest records show only 10 fish greater than 70" have been harvested from 1983-2001. The 70" size limit season basically eliminates harvest, yet allows anglers the opportunity to catch and release. In 2001 the combined harvest for the Lake and Dells was 21, similar to the 1996-99 level, but if that harvest is cut in half because of no harvest in 2000, it's about a 50% reduction (Table 3).

Sauk Dam

The harvest of sturgeon below the Sauk Dam shows an increasing trend (Table 3). Under the 45" size limit (pre 1991) harvest averaged 18/yr, though a high of 50 fish occurred in 1989. Following implementation of the 50" size limit in 1991, the 1991-95 average was 22/yr, which increased to a fairly consistent level of 36/yr during 1996-99. The composition of fish within 5" of the size limit has remained above 50%, but does not show the dramatic upward trend like the Lake Wisconsin/Dells site (Table 4). It was 62% for fish over 50" during 1983-90, then dropped to 51% during 1991-95 and went back up to 57% in 1996-2001. The disproportionate harvest of females is not occurring to the same degree as the upstream area, but never the less it increased to about 4 females for each male within the 55-59" group, then dropped to 2:1 for fish over 60" (Table 5). In a balanced fishery the F:M ratio should increase with older age fish. A record 52 fish were harvested in 2001, but the alternating 70"/50" size limit rule dropped the average harvest for the 2000-2001 period to 26/yr or 28% less than the 1996-99 average of 36 (Table 3). A creel census conducted during the 1999 and 2000 sturgeon seasons below the Sauk Dam noted a drop in fishing pressure from 70,808 hours to 44,367 hours as a result of the "no harvest" regulation (Table 1). This was a 37% decline, but it shows that anglers didn't totally quit.

The interesting aspect of the Sauk Dam fishery is that a recent radio tracking study by Brent Knights, et. al., of the USGS (publication pending in the Transactions American Fishery Society) has located a core sturgeon area in Pool 10 of the Mississippi River, just upstream from its confluence with the Wisconsin River. It documented 8 of 16 tagged fish to seasonally move from the Mississippi River in late summer/fall upstream 90 miles to occupy the 2.7 mile length of river below the Sauk Dam. They remained there through the following spring, presumable spawning, then returned to the Mississippi River core area for the summer. It is interesting that, fishing regulations do not allow harvest of lake sturgeon

from the Mississippi River where it is considered rare. Little data exists on the Pool 10, Mississippi River population, other than the catch and harvest monitoring which occurs below the Sauk Dam. Possibly it is

the mature segment of this Mississippi River population which is being subjected to harvest when it makes its "spawning run". It is not known if these fish successfully spawn below the Sauk Dam. Recruitment to this fishery has been documented coming over the dam from Lake Wisconsin. Of 1,971 fish tagged between 1979-81 in Lake Wisconsin and below the Dells Dam, 9 were recaptured within 5 years by commercial fishermen in Pool 10 of the Mississippi River (Larson, F.M. Report #136). Probably a fair number move over the dam during high water. Smaller size fish are present below the Sauk Dam as evident by the length distribution of angler caught fish (Table 2).

Upriver Re-stocking

Sturgeon had originally been documented as far upstream on the Wisconsin River as Stevens Point. During the 1900s water pollution and fragmentation of the river by dams, led to its only viable range being downstream from the Kilbourn Dam at Wisconsin Dells. With much improved water quality since the 1980s, a restocking effort has been underway to re-establish the sturgeon throughout its original "home range". Initially (1991-92) juvenile fish (30-40") were transferred from Lake Wisconsin, but this was discontinued after it was learned that natural reproduction had declined from the levels observed in the early 80s. Beginning in 1997 eggs were taken from one or two females and fertilized by several males below the Dells Dam. Approximately 20,000 fingerlings (mostly 5-6") at a cost of $.50 each have been reared at the Wild Rose hatchery. Most of the stocking has occurred in the Steven Point flowage. From the juvenile stocking in the early 90s, about 5-6 recapture reports have occurred annually. Also paper mills have reported occasional sturgeon that have been impinged on their trash racks. During 2001 several reports were noted of 12-14" fish from the year 2000 fingerling stocking, indicating survival. A comprehensive survey of the Stevens Point flowage is planned for 2002 to evaluate survival of the restocking effort. A "plant back" of about 10,000 fingerlings, along with some fry, has occurred from 1997-01 below the Dells Dam to account for the egg taking operation.

	Juvenile transfer
1991	59
1992	123

	Eggs taken below Dells Dam	Stocking upstream from the Dells (mostly Stevens Point flowage		Plant back below the Dells	
		Fry	Fingerlings	Fry	Fingerlings
1997	154,000		2,764		
1998	216,666	77,900	20,700	30,000	
1999	174,562		25,224		3,793
2000	784,997	397,390	20,992	87,771	
2001	418,542	57,756	19,461	28,782	6,548

TABLE 1 **LAKE WISCONSIN**

ANGLER CATCH RATE (Sturgeon/hour) **FISHING PRESSURE**

Year	Source	Actual # Fish	Total # Hours	Catch Rate by Size Group <45"	>45"	>50"	All	Angler Diary Observations Sturgeon Anglers Seen/Hour	Creel Census Sturgeon Fishing Pressure
1979	Creel			0.19	0.01		0.20		13,073 hours
1979	Diaries	234					0.47		
1985	Diaries	581		0.38	0.05		0.43		
1986	Diaries	572		0.30	0.03		0.33		
1992	Diaries	45	947	0.04	0.01		0.05	1.6	
1993	Diaries	96	869	0.10	0.02	0.01	0.11	1.5	
1994	Diaries	15	220	0.04	0.03	0.01	0.07	1.6	
1995	Diaries	92	908	0.06	0.04	0.01	0.10	0.8	
1995	Creel	97	1,197				0.08		4,426 hours
1996	Diaries	42	890	0.04	0.01	0.00	0.05	0.6	
1997	Diaries	58	770	0.05	0.02	0.01	0.07	0.7	
1998	Diaries	39	840	0.03	0.02	0.02	0.05	0.8	
1998	Creel	66	774				0.09		3,930 hours
1999	Diaries	66	454	0.13		0.01	0.15	1.0	
2000	Diaries	30	274	0.10	0.01	0.01	0.11	3.8	
2001	Diaries	33	400	0.07	0.01	0.01	0.08	7.5	

DELLS DAM

ANGLER CATCH RATE (Sturgeon/hour) **FISHING PRESSURE**

Year	Source	Actual # Fish	Total # Hours	Catch Rate by Size Group <45"	>45"	>50"	All	Angler Diary Observations Sturgeon Anglers Seen/Hour	Creel Census Sturgeon Fishing Pressure
1992	Diaries	23	170	0.15	0.02		0.17	0.8	
1993	Diaries	63	60	0.97	0.08		1.05	1	
1994	Creel	25		0.18			0.18		
1995	Diaries	35	262	0.11	0.02		0.13	0.7	
1996	Diaries	11	162	0.06	0.01		0.07	1.4	
1997	Diaries	14	83	0.14	0.02	0.01	0.16	0.9	
1998	Diaries	29	143	0.19	0.01	0.01	0.20	1.5	
1999	Diaries	98	197	0.44	0.06		0.50	1.1	
2000	Diaries	14	62	0.23	0.00	0.00	0.23	1.2	
2001	Diaries	28	36	0.78	0.06	0.00	0.84	1	

SAUK DAM

ANGLER CATCH RATE (Sturgeon/hour) **FISHING PRESSURE**

Year	Source	Actual # Fish	Total # Hours	Catch Rate by Size Group <45"	>45"	>50"	All	Angler Diary Observations Sturgeon Anglers Seen/Hour	Creel Census Sturgeon Fishing Pressure
1992	Diaries	44	130	0.24	0.10		0.34	1.4	
1993	Diaries	48	234	0.17	0.03		0.20	1.5	
1994	Diaries	23	95	0.22	0.02		0.24	2.6	
1995	Diaries	34	378	0.06	0.03	0.01	0.09	0.5	
1996	Diaries	2	32	0.06	0.00		0.06	0.6	
1997	Diaries	18	148	0.10	0.02		0.12	0.6	
1998	Diaries	2	22	0.09	0.00		0.09	2.7	
1999	Diaries	0	0	0	0.00				
1999	Creel						0.01		70,808 hours
2000	Creel						0.02		44,367 hours
2000	Diaries	17	78	0.11	0.11	0.01	0.23	3.2	
2001	Diaries	4	91	0.01	0.03	0.02	0.04	5	

TABLE 2 Size Distribution of Angler Caught Lake Sturgeon

Lake Wisconsin

Year	Source	# Fish	10-19"	20-29"	30-39"	40-44"	45-49"	50"+	<45":45"+	<50":50"+
1979-1981	Charts	1411	17%	22%	41%	15%	3%	2%	20:1	58:1
1985-1986	Diaries	1151	18	43	24	10	4	1	19:1	88:1
1992	Diaries	49	2	6	34	36	18	4	3:1	23:1
1993	Diaries	58	6	10	38	28	8	10	4:1	9:1
1994	Diaries	18	11	0	28	11	39	11	1:1	8:1
1995	Diaries	92	20	0	15	16	26	14	2:1	6:1
1995	Creel	99	24	10	21	18	20	7	3:1	13:1
1996	Diaries	42	10	33	19	12	16	10	3:1	10:1
1997	Diaries	56	2	34	16	11	20	17	2:1	5:1
1998	Diaries	40	2	27	15	8	8	40	1:1	2:1
1999	Diaries	66	27	29	30	5	0	9	10:1	10:1
2000	Diaries	31	20	39	20	9	6	6	7:1	15:1
2001	Diaries	33	15	55	6	12	6	6	7:1	15:1

Dells Dam

Year	Source	# Fish	10-19"	20-29"	30-39"	40-44"	45-49"	50"+	<45":45"+	<50":50"+
1992	Diaries	28	8%	28%	42%	10%	4%	8%	9:1	15:1
1993	Diaries	64	2	35	53	4	6	0	10:1	64:0
1994	Diaries	No Data								
1995	Diaries	35	17	14	37	14	14	3	5:1	34:1
1996	Diaries	11	18	9	36	18	18	0	5:1	11:0
1997	Diaries	14	0	43	36	7	7	7	6:1	6:1
1998	Diaries	28	4	39	42	11	0	4	27:1	27:1
1999	Diaries	96	25	26	26	10	10	0	9:1	96:1
2000	Diaries	12	42	17	33	8	0	0	12:0	12:0
2001	Diaries	47	6	58	19	13	4	0	22:1	47:0

Sauk Dam

Year	Source	# Fish	10-19"	20-29"	30-39"	40-44"	45-49"	50"+	<45":45"+	<50":50"+
1992	Diaries	42	0%	2%	41%	26%	21%	10%	2:1	10:1
1993	Diaries	52	4	11	54	15	10	6	6:1	16:1
1994	Diaries	21	0	14	38	38	10	0	10:1	21:1
1995	Diaries	41	5	12	29	22	17	15	2:1	6:1
1996	Diaries	2	0	50	50	0	0	0	2:0	2:0
1997	Diaries	18	11	33	33	6	17	0	5:1	18:0
1998	Diaries	2	0	50	50	0	0	0	2:0	2:0
1999	Diaries	No Data								
2000	Diaries	17	12	24	12	0	47	5	1:1	16:1
2001	Diaries	4	0	0	0	25	25	50	1:3	2:2

TABLE 3 Angler Harvest of Lake Sturgeon

Year	L Wi	Dells Dam	PduSac Dam	Lower Wi R
1983	63	3	13	0
1984	44	3	7	5
1985	100	4	7	2
1986	82	12	6	0
1987	47	10	19	2
1988	58	29	14	5
1989	31	22	50	6
1990	24	9	25	1
1991*	23	7	24	1
1992	13	13	6	0
1993	10	10	16	1
1994	9	13	33	0
1995	10	15	29	0
1996	7	12	41	0
1997	12	7	32	1
1998	14	10	36	0
1999	10	8	35	4
2000^	0	0	0	0
2001	8	13	52	1

* Size limit changed from 45' to 50"
^ Begin alternate year 70" / 50" minimum size limit

Averages

45" Size Limit				
1983-1990	56	12	18	3
50" Size Limit				
1991-1995	13	12	22	0.4
1996-1999	11	9	36	1.2
70" Size Limit				
2000	0	0	0	0
50" Size Limit				
Half of 2001	4	6.5	26	0.5

Half of 2001 compared to 1996-1999 average				
	-63%	-29%	-28%	-58%

TABLE 4 Length Distribution of Angler Harvested Lake Sturgeon

LAKE WISCONSIN

Year	# Fish	45-49"	50-54"	55-59"	60+"
1978-1981 (45" limit)	79	54%	16%	20%	10%
1983-1990 (45" limit)	452	52	21	15	12
1983-1990 (Fish >50")	217		42	31	24
1991*-1995	65		52	23	25
1996-2001	52		71	25	4

DELLS DAM

Year	# Fish	50-54"	55-59"	60+"
1983-1990 (Fish >50")	48	50%	29%	21%
1991*-1995	57	60	12	28
1996-2001	49	68	14	18

SAUK DAM

Year	# Fish	50-54"	55-59"	60+"
1983-1990 (Fish >50")	63	62%	17%	21%
1991*-1995	109	51	31	18
1996-2001	196	57	29	14

*50" size limit began in 1991

TABLE 5 Sex Ratio of Harvested Lake Sturgeon - 1997-2001

	L. Wi / Dells Dam		Sauk Dam		Combined	
Size Group	# Fish	M : F	# Fish	M : F	# Fish	M : F
50-54"	23	1.1 : 1	21	1 : 1.3	44	1 : 1.1
55-59"	8	1 : 7	14	1 : 3.7	22	1 : 4.5
60"+	2	1 : 1	9	1 : 2	11	1 : 1.8

Table 6. **Lake Sturgeon Harvest by Week**

LAKE WISCONSIN

Week	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Average
1-3	39%	36%	47%	30%	26%	15%	50%	22%	30%	0%	25%	4%	20%	0	12%	26%
4	18	30	0	22	17	46	10	0	20	29	42	4	20	0	39	21
5	11	11	27	17	13	8	20	22	10	29	8	13	10	0	12	15
6	32	23	27	26	43	31	20	55	40	42	25	73	50	0	38	38

DELLS DAM

Week	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Average
1-3	55%	38%	32%	33%	57%	46%	44%	46%	47%	25%	43%	56%	12%	0	23%	40%
4	35	21	18	11	29	15	33	0	19	8	0	11	12	0	15	16
5	10	6	27	44	0	15	11	8	13	25	14	0	12	0	15	13
6	0	35	23	11	14	23	11	46	23	42	43	33	64	0	47	31

SAUK DAM

Week	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Average
1-3	75%	71%	48%	39%	50%	50%	34%	55%	38%	20%	28%	26%	51%	0	48%	45%
4	20	0	10	26	8	17	16	9	17	15	22	3	9	0	15	13
5	0	14	14	13	12	17	16	6	28	21	16	23	14	0	21	15
6	5	14	28	22	30	17	34	30	17	44	34	48	26	0	16	27